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DEPARTMENT OF AGRICULTURE

BULLETINS 1-20

1905-1907

DAIRY AND COLD STORAGE
COMMISSIONER'S SERIES

No.

APPLICATION FOR COLD STORAGE SUBSIDY.

EXHIBIT 4, to accompany the application made by.....
 of..... in the
 Province of..... for the subsidy offered under *The Cold Storage*
Act for the erection of a cold storage warehouse.

NOTE.—Attach a copy of sketch showing location of warehouse or proposed warehouse in regard to connection with railway lines and wharfs.

DEPARTMENT OF AGRICULTURE
BRANCH OF THE DAIRY AND COLD STORAGE COMMISSIONER
OTTAWA, CANADA.

BUTTERMAKING ON THE FARM

BY

GEORGE H. BARR

BULLETIN No. 17.

DAIRY AND COLD STORAGE COMMISSIONER'S SERIES

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LETTER OF TRANSMITTAL.

The Honourable

The Minister of Agriculture.

SIR,—I beg leave to submit Bulletin No. 17, Dairy and Cold Storage Commissioner's series, entitled 'Buttermaking on the Farm,' which has been prepared under my direction by Mr. Geo. H. Barr of the Dairy staff.

Buttermaking on the farm is almost a thing of the past in some sections of the country, where 'Dairy' buttermaking has been superseded by the cheese factory and the creamery. The evolution of the creamery is a natural outcome of the tendency towards division of labour and co-operation, and the creamery system has many advantages which recommend it to the dairy farmer. Greater uniformity of product, a higher average quality, ease of marketing on account of the larger quantity to be sold as one lot, and better average prices are some of the points which have made the creamery system popular.

'Dairy' butter as defined by 'The Butter Act, 1903' is butter made from the milk of less than 50 cows. The total quantity of 'dairy' butter manufactured in Canada is estimated to be greater in quantity and value than the product of the creameries. The creamery man is inclined to oppose any effort to improve the condition of the dairy butter trade, on the assumption that poor results from the making of dairy butter encourage the spread of the factory system, and that it is in the real interest of the milk producer that the creamery or cheese factory should become general.

There is a certain amount of truth in the foregoing contention, and the farmer who is within reach of a well managed creamery will do well to patronize it, but the fact remains that there are many hundreds of dairy farmers in Canada who cannot avail themselves of the advantages of a creamery, or of a cheese factory, and it is in the interest of the producers of creamery butter that the quality of the dairy butter should be made as fine as possible. A large quantity of inferior dairy butter helps to lower the general average of the whole Canadian output and also acts as a serious check to consumption. If all the dairy butter was of finest quality, the increase in consumption would be enormous, and better average prices would prevail for all butter. The annual loss to the farmers of Canada, as represented by the difference in the value of dairy and creamery butter, amounts to several million dollars a year.

It will hardly be denied by any one at all familiar with the Canadian butter trade, that there is great room for improvement in the quality of a large proportion of the dairy butter; that there is a wide margin between the average price of dairy and creamery butter; and that creamery butter is much more popular with the general public than dairy butter. Dairy buttermakers who desire to improve would do well therefore to take into consideration the means that have been employed in the creamery to raise the standard of quality to a higher level.

In the first place, the successful creamery buttermaker has had training and experience and brings more or less skill and accurate knowledge to bear on his work. The creamery buttermaker is supplied with a full outfit of utensils and apparatus which enable him to recover a maximum quantity of butter from the milk. The creamery buttermaker gives careful attention to the ripening of the cream, so as to develop desirable flavours and to prepare it for churning with as little loss as possible. Careful attention is paid to the matter of temperature in the cream during the ripening process and at the time of churning. No guess work is allowed in this connection, all creameries being supplied with thermometers for that purpose. The creamery buttermaker who knows his business pays careful attention to the packing of the butter, puts it in a neat, well finished package, and makes it as attractive looking as possible. Creamery butter, which gives satisfaction, is not allowed to remain in a warm place to develop rancid flavours, but is protected from injury by being kept at a low temperature.

Neglect of these essentials is what makes much of the difference between creamery butter and dairy butter, and it is with a view of giving some information on these points that this bulletin has been prepared.

I have the honour to recommend that it be printed for general distribution.

I have the honour to be, sir,
Your obedient servant,

J. A. RUDDICK.

Dairy and Cold Storage Commissioner.

OTTAWA, Ont., May 1, 1907.

BUTTERMAKING ON THE FARM.

BY GEO. H. BARR.

SOME OF THE DEFECTS IN DAIRY BUTTER.

The main defects in dairy butter as compared with creamery butter are, (1) bad flavour, (2) staleness or rancidity, (3) too many shades of colour, and (4) unsuitable packages and too many different styles. The flavour is of the highest importance, and no matter how good the butter may be in other respects, if the flavour is wrong, it is bound to be classed as an inferior article. Staleness and rancidity, so common in dairy butter, are due largely to the fact that the cream, and the butter made from it, are not kept at a low enough temperature.

Any taint that may be in the milk or cream will be, to some extent, carried into the butter. Therefore, the dairy buttermaker will see at once the necessity of having healthy cows, providing them with wholesome feed and pure water, and having the cream properly taken care of until time of churning.

Feeds that will injure the flavour of the butter and which should not be fed to milch cows.

1. Turnips and turnip tops.
2. Rape or rye.
3. Decayed ensilage.
4. Leaks, onions, or apples in large quantities.

Other causes of taints in cream.

1. Cows' udders and teats in an unclean condition at milking time.
2. Milking in unclean stables.
3. Using unclean, wooden, galvanized or rusty milking pails.
4. Separating the milk in the stables.
5. Improperly cleaned separators.
6. Keeping the cream in cellars or other places where there are roots or vegetables.
7. Keeping the cream for several days at a temperature over 55 degrees.
8. Cows drinking water from stagnant ponds, or the leakage from barnyards.

CONDITIONS THAT ARE NECESSARY TO PRODUCE FINE FLAVOURED CREAM.

Pure Water. The cows should have at all times an abundant supply of pure water to drink. When cows are compelled to drink the water of swamps, muddy ponds or sluggish streams and ditches, in which there is decaying animal matter, including their own droppings, there is a constant menace to their health, and unless the cows are in good health, they cannot give first-class milk. Moreover, the mud, often full of foul germs, which collects on the legs, flanks and udders of the cows and falls into the milk at the time of milking, is a direct source of infection.

Salt. When cows have free access to salt at all times, they will keep in better health, will give more milk; and the cream from this milk will have a better flavour, and keep sweet longer, than when they do not get any at all, or receive it only at intervals.

Milking. Cleanliness in the stable is desirable at all times, but especially at milking time the stable should be clean, and free from dust. The udders, teats, and flanks of the cows should be well brushed before milking. Only bright, clean, tin pails should be used to milk in. Galvanized pails are difficult to keep clean, and bad flavours have been traced to their use.

METHODS OF CREAMING.

There are three common methods of removing the cream from the milk: (1) the shallow pan, (2) deep setting, and (3) the hand separator. All these methods are used to some extent.

THE SHALLOW PAN.

This method has many defects, and we do not recommend it. Cream from this method is apt to be too thin, by having too much milk incorporated in skimming. The large surface exposed in the pans, and the length of time that it stands, favour the absorption of odours and infection which comes from dust, &c., and also result in the cream becoming leathery, making lumpy cream for churning, which causes heavy loss of fat in the buttermilk. The comparatively high temperature of the milk and cream in shallow pans encourages the development of bad flavours. Like all other gravity methods, the shallow pan leaves a large percentage of fat in the skim milk.

The best results from using shallow pans are obtained by setting the milk immediately after milking, in pressed tin pans without seams, about 3 inches deep, placing the pans on a cool surface, such as a clean cement floor, or in a large pan or box where cold water is allowed to run around the pans. Skimming should take place about 24 or 36 hours from setting. The cream should be taken off carefully by separating the cream from the edge of the pan with a thin bladed knife, when the cream may be run into a cream can, care being taken to run in as little milk as possible.

DEEP SETTING.

The deep setting method is a very decided improvement on the shallow pans. The best results, both as to quality and effective creaming, are secured by putting the milk,

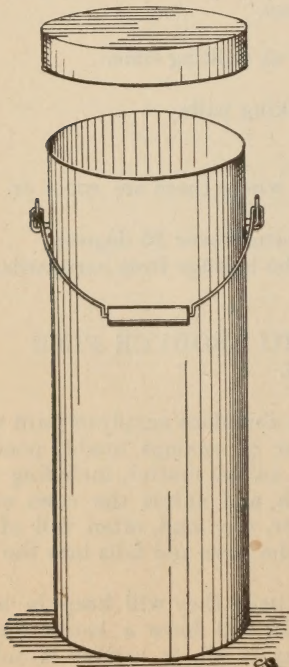
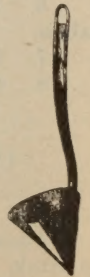


Fig. 1.

as soon as drawn, into cans about 8 inches in diameter and 20 inches deep. (Fig. 1). The cans are then placed in a tank containing ice water (Figs. 2 and 3) and left for at least 24 hours before skimming. Fig. 4 shows a convenient style of skimmer for the deep setting method. The tank will require to be 24 inches deep and large enough to hold as many cans as the herd will fill at two or three milkings. The tank must be water tight and provided with a 3 inch overflow 17 inches from the bottom, and also a plug at the bottom to drain off the water for cleaning. The tank should be fitted with a cover and the whole protected from the weather. It would be folly to use the deep setting method without ice in this country, where it can be put up so easily and



cheaply, but if it is not available for any reason, the next best thing is to have the tank placed near the well, so that all water used for various purposes may be first pumped into the tank as shown in the illustration, and then allowed to overflow into the stock trough or other receptacle. If ice is used running water in the tank would only waste the ice.

The ideal arrangement would be to have a special milk room with ice house attached.

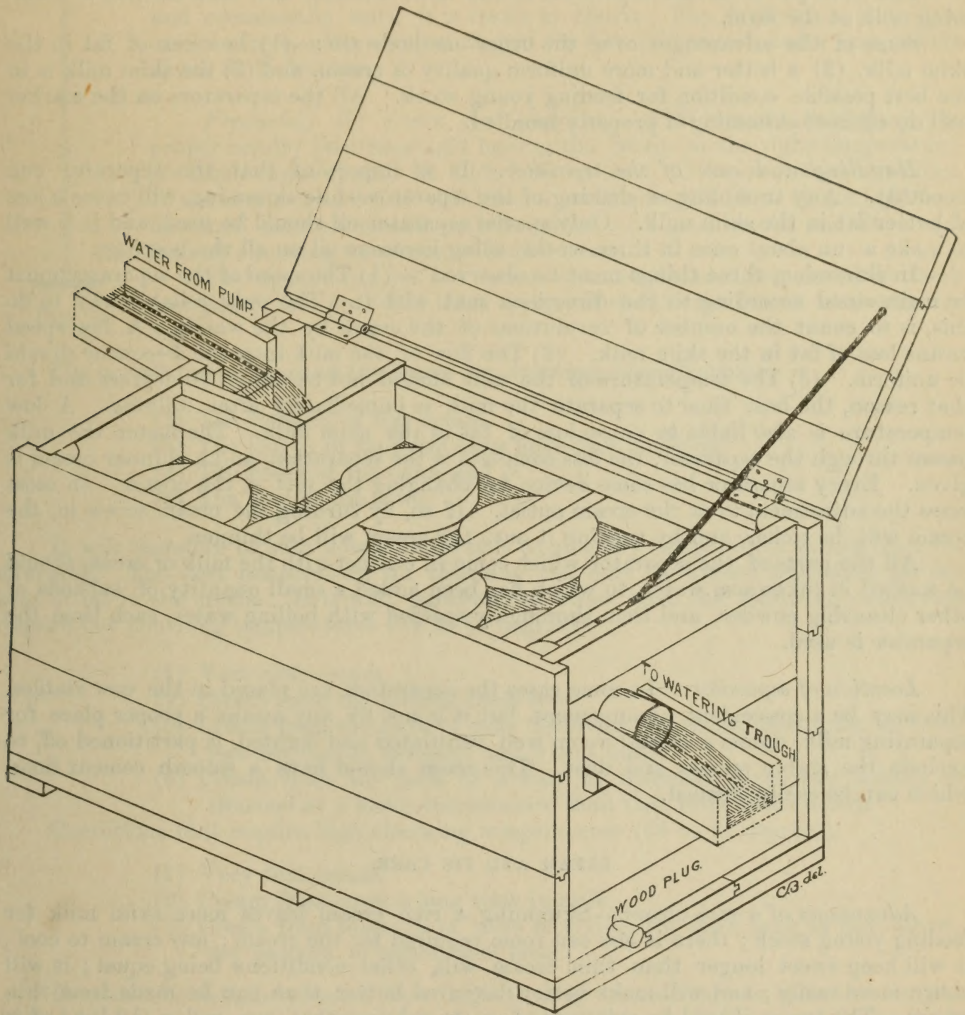


Fig. 2.

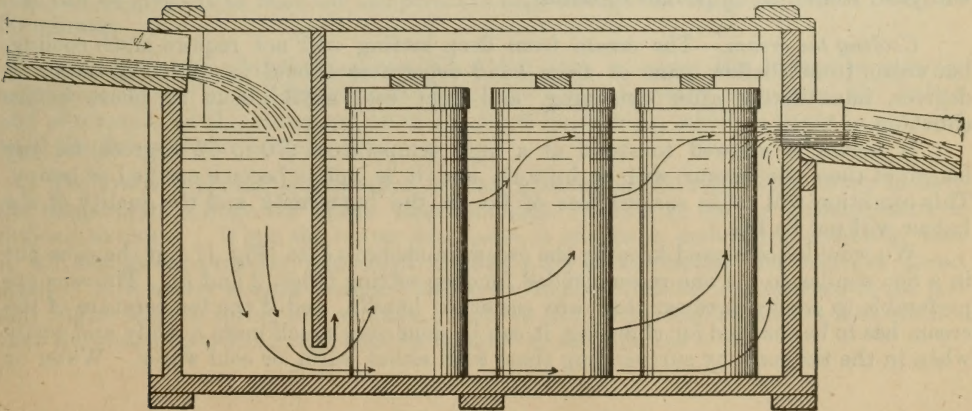


Fig. 3.

THE HAND POWER SEPARATOR.

The hand power cream separator, is the most reliable and best method of skimming milk at the farm.

Some of the advantages over the other methods are:—(1) less loss of fat in the skim milk, (2) a better and more uniform quality of cream, and (3) the skim milk is in the best possible condition for feeding young stock. All the separators on the market will do efficient skimming if properly handled.

Handling and care of the separator. It is important that the separator run smoothly. Any trembling or shaking of the separator while skimming, will cause a loss of butter fat in the skim milk. Only special separator oil should be used, and it is well to make a run about once in three weeks, using kerosene oil on all the bearings.

In skimming, three things must be observed:—(1) The speed of the separator must be maintained according to the directions sent with it. The only reliable way to do this, is to count the number of revolutions of the crank by the watch. A low speed means loss of fat in the skim milk. (2) The flow of the milk into the separator should be uniform. (3) The temperature of the milk should not be under 90 degrees and for that reason, the best time to separate the milk is immediately after milking. A low temperature is also liable to cause loss of fat in the skim milk. The faster the milk passes through the separator, the less complete is the separation, and a thinner cream is given. Every separator has some device for changing the test of the cream. In most cases the adjustment is at the cream outlet. If so, by turning the cream screw in, the cream will be richer, and by turning it out, the cream will be thinner.

All the parts of the separator which come in contact with the milk or cream should be washed in lukewarm water, to which has been added a small quantity of sal soda or other cleansing powder, and then thoroughly scalded with boiling water, each time the separator is used.

Location of separator. In some cases the separators are placed in the cow stables. This may be a convenient arrangement, but it is not by any means a proper place for separating milk, unless a special room well ventilated and lighted, is partitioned off, to exclude the stable odours and dust. This room should have a smooth cement floor, which can be easily cleaned.

CREAM AND ITS CARE.

Advantages of a rich cream.—Skimming a rich cream leaves more skim milk for feeding young stock; there is less can room required for the cream; less cream to cool; it will keep sweet longer than thin cream will, other conditions being equal; it will churn more easily; and will make better flavoured butter than can be made from thin cream. The cream should be skimmed of such richness that one gallon (10 lbs.) of it will yield from 3 to 3½ pounds of butter.

Cooling the cream.—The cream from deep setting will not require much cooling, but cream from shallow pans or from hand separators should be cooled to under 60 degrees, immediately after skimming, and kept cool until about 12 hours before churning.

If cream is allowed to stand at a high temperature (70 to 75 degrees) for any length of time, the flavour will be injured, and it is apt to become curdled or lumpy. This condition will cause serious loss of fat in the buttermilk and the quality of the butter will not be fine.

We would recommend keeping the cream in shotgun cans (Fig. 1) and the cans put in a box similar to the one recommended for deep setting (Figs. 2 and 3). Tin cans are preferable to crocks, because they are easier to handle, and if the temperature of the cream has to be changed for churning, it can be done very much more quickly and easily when in the tin cans, by surrounding them with either warm or cold water. Water or



Fig. 5.

ice should not be put into the cream to raise or lower the temperature. Warm cream from the separator should not be added to cream already cooled. The cream should be stirred well each time a fresh lot is added, and occasionally until it is ready to churn. Fig. 5 shows a first class cream stirrer, with a saucer shaped tin disc perforated, and a wire handle about 24 inches long.

Preparing the cream for churning.—This means developing the proper acidity (sourness) and having the cream at the right temperature. No fresh cream should be added for at least 12 hours before churning. If the cream is sweet at this time, a small quantity (5 to 10 p.c.) of clean flavoured sour skim milk may be added with good results and the cream kept at churning temperature for 12 hours.

The appearance of the cream when ready to churn should be thick and glossy, and pour like thick syrup; it should smell and taste slightly sour.

The proper temperature of the cream for churning depends upon :

- (1) The richness of the cream,
- (2) The length of time the cows have been milking,
- (3) The breed of the cows, and
- (4) The feed of the cows.

It will therefore be seen how difficult it is to give any temperature as the best, for churning. The best temperature for churning can only be known by testing the per cent of fat in the cream. It is well, however, to know that the following conditions require low churning temperatures (54 to 62 degrees):

- (1) Very rich cream,
- (2) Cream from the milk of fresh cows,
- (3) Cream from the milk of cows receiving succulent feed, such as fresh pasture, clover, ensilage, and wheat bran.
- (4) Cream from the milk of Jersey or Guernsey cows can usually be churned at a lower temperature than that from other breeds.

Conditions that require high churning temperatures (64 to 75 degrees):

- (1) Very thin cream,
- (2) Cream from cows a long time in milk,
- (3) Cream from the milk of cows receiving dry feed, such as hay, straw, dry pasture, or cotton seed meal.

It cannot be definitely stated how high it may be necessary to raise the temperature of the cream to make butter under some of the above conditions, and the best rule that can be given is to raise the temperature high enough to bring the butter in about 30 minutes.

Too high a churning temperature is not desirable, it causes the butter to come in soft lumps instead of in flaky granular form, and causes a greasy texture in the butter and also results in the incorporation of too much buttermilk, which is likely to sour and spoil the flavor of the butter.

Too low a churning temperature is also undesirable, although it is better to have the temperature a little low rather than too high. Cream at too low a temperature is difficult to churn. When the butter does come, it will be in such a firm condition that it will not gather properly, and is apt to make a dry brittle butter that does not spread easily. It is nearly always necessary to have a higher churning temperature in the fall and winter than in spring and summer. Aim to have the cream at such a temperature that the churning will be completed in from 25 to 30 minutes.

CHURNING.

All the cream should be passed through a finely perforated tin strainer as it is being put into the churn. (See Fig. 6.)



Fig. 6.

Amount of cream in the churn. Churning will be completed in the shortest time when the churn is about one-third full. The churn should never be more than half full. If a small amount of cream is being churned, it is difficult to gather the butter properly and it is apt to be over-churned.

Colouring.—When colouring is used, it should be added to the cream just before churning is commenced. Colouring does not improve the quality of the butter, but in the late fall and winter months a little colouring improves its appearance. The butter makers must be guided in using colour by the tastes of their customers. Too deep a shade is repulsive.

Speed of the churn.—The proper speed for the churn depends upon its size. That speed which gives the greatest concussion will be the most effective.

Adding water to the cream in the churn.—If the cream has been properly prepared and is at the right temperature, the churning may be finished without adding any water. If for any reason the butter is coming a little too fast, it is advisable to add, just when the cream is breaking, some water with a little salt in it about two degrees colder than the cream. This will assist in separating the butter from the buttermilk. Two common causes for cream churning too slow, are (1) too much cream in the churn and (2) the temperature of the cream is too low.

When to stop the churn.—This is an important point and it has a great deal to do with the quality of the butter. The churn should be stopped when the granules are about the size of wheat or split pease. When the butter is churned to too small granules, many of them will go through the strainer into the buttermilk and cause a considerable loss.

Over-churning should be avoided as much as under-churning. Over-churned butter will retain a large amount of buttermilk, which will be difficult to remove in washing.

The buttermilk should be drawn off as soon as churning is completed.

The cream strainer.—A dipper with a wire gauze (fig. 6) can be used for straining the buttermilk.

Washing the butter.—The butter should be washed as soon as churning is finished and only pure clean water should be used. If the butter is for immediate use, rinse the butter by sprinkling two or three dipperfuls of cold water over the butter, allowing it to run off at once. Then run in a little less water than there was cream and revolve the churn as in churning until the granules are about the size of large peas and draw the water off immediately. In very warm weather have the water about 2 degrees colder than the buttermilk and in cold weather from 2 to 3 degrees warmer.

If the butter is intended for packing, run in slightly more water than there was cream, about 2 degrees colder than the buttermilk, and revolve the churn quickly about half a dozen times and draw it off; then wash a second time using a little less water than there was cream, at the same temperature as the buttermilk, and revolving the churn as in churning until the granules are about the size of large peas and draw off the water at once.

Salting the butter.—A large quantity of dairy butter is too heavily salted and there is very little uniformity in the amount of salt used. We would suggest that for prints $\frac{1}{2}$ to $\frac{3}{4}$ of an ounce per pound be used, and for packed butter not more than one ounce per pound.

In creamery buttermaking the salting is done almost entirely in the churn. If the amount of butter in the churn can be fairly well estimated, it is the best method to follow. Add the salt as soon as the washing water is drained off, sifting on half of the salt evenly over the butter; then turn the butter over with a wooden ladle (fig. 7) or by turning the churn partly over, and sift on the balance of the salt; put on the cover of the churn and revolve slowly until the butter is gathered into a solid mass, and allow it to lie in the churn for ten or twenty minutes before working it. If the salting is done on the worker, the butter can be weighed and the salting done accurately. Take the butter out of the churn in the granular form, after weighing it, spread it evenly over the worker and sift all the salt on before working is commenced. Endeavour to have the salt well mixed with the butter while it is still in the granular form.



Fig. 7.

Working the butter.—For farm buttermaking, a lever butter worker is preferable to a butter bowl for working the butter. (See Fig. 8). In working the butter a sliding or scraping motion should be avoided. The lever should be pressed downward, double the butter over with a ladle, or by inserting the lever under the butter at one side of the worker, roll it over and work as before. When the butter is sufficiently worked, it should present a smooth solid appearance when cut with a sharp ladle, and when pressed between the worker and the ladle the moisture should show in small beads evenly distributed over the cut surface. Butter which has been salted in the churn will not require as much working as that salted on the worker. Only fine dairy salt should be used and it should be kept in a clean place, as salt will absorb odours and thus may injure the flavour of the butter.

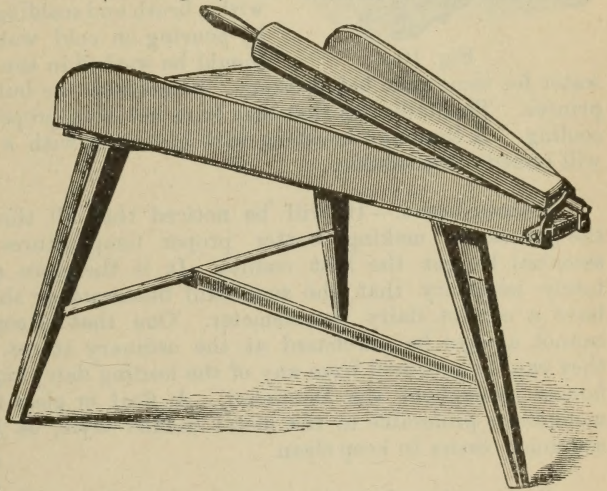


Fig. 8.

PACKAGE.

If there is any one thing that needs improvement in the dairy butter business, it is the package.

The butter is put up in all sizes, shapes and forms; it is wrapped in factory cotton, towels, paper, and some is not wrapped at all. For local trade there should only be one package, the brick shaped 1 pound print, wrapped neatly in parchment paper. It is much more economical to buy a good printer than the ordinary printers offered for sale and we would recommend the style shown in Fig. 9. For packed butter there is nothing as neat and good as a 10 or 20 lb. spruce tub, lined with parchment paper.

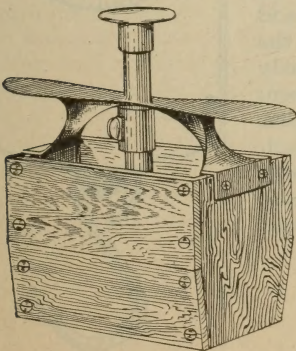


Fig. 9.

UTENSILS AND THEIR CARE.

The churn.—The barrel churn (Fig. 10) is the most convenient and easiest to keep sweet and clean. Before using, it should be well scalded with boiling water and then cooled by revolving a few minutes with cold water in it. After churning, a pailful of cold water should be put in the churn and revolved to wash out any butter that may be in it; then thoroughly scald it with boiling water and leave it open in a clean, dry place. A little salt sprinkled in the churn after scalding, helps to keep it sweet. We would strongly recommend washing the churn occasionally with hot lime water to keep it sweet.

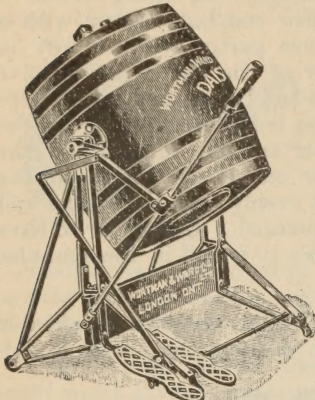


Fig. 10.

water for some time before using. Sometimes the butter will stick to the worker and printer. This indicates that they have not been properly brushed with hot water before cooling. A thorough brushing with hot water with a little salt added, before cooling, will remedy this trouble.

Thermometers.—It will be noticed that all through the process of making butter proper temperatures are essential to get the best results. It is therefore absolutely necessary that the successful buttermaker should have a correct dairy thermometer. One that is correct cannot always be purchased at the ordinary stores, but they can be procured from any of the leading dairy supply houses throughout the Dominion. A float or glass thermometer is preferable to the metal backed style, as they are much easier to keep clean.

Scales.—A scale such as illustrated in Fig. 11 is very convenient for dairy purposes as well as for other household work. They can be purchased from hardware merchants or from the dairy supply houses.

Parchment Paper.—Print butter should always be wrapped in parchment paper of good quality, and it will add to the attractiveness of the package if the name of the farm or dairy, and the address of the proprietor, are neatly printed on each wrapper. Many dairy buttermakers seem to forget that the merchant who buys their butter must resell it, and that the appearance of the butter has much to do with a customer's decision in buying. No one cares to buy a slovenly package of butter, for it is a fairly safe inference that if the outside of the butter looks clean and attractive the inside will be all right, and vice versa.

To get the best results in farm dairy work :—

- (1) Keep good cows,
- (2) Feed them liberally,
- (3) Keep them comfortable and clean when in the stable,

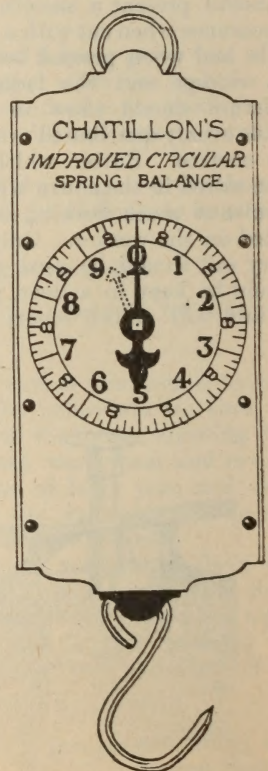


Fig 11.

- (4) Skim a rich cream,
- (5) Keep the cream cool,
- (6) Churn at the temperature that will give a flaky granule in the butter,
- (7) Use clean pure water for washing butter, not more than three degrees colder or warmer than the buttermilk,
- (8) Put the butter up in neat, clean, attractive packages,
- (9) Keep everything in and about the dairy clean and attractive.

NOTE.—Copies of this bulletin in English or French may be secured free of charge on application to the Dairy and Cold Storage Commissioner, Ottawa.

